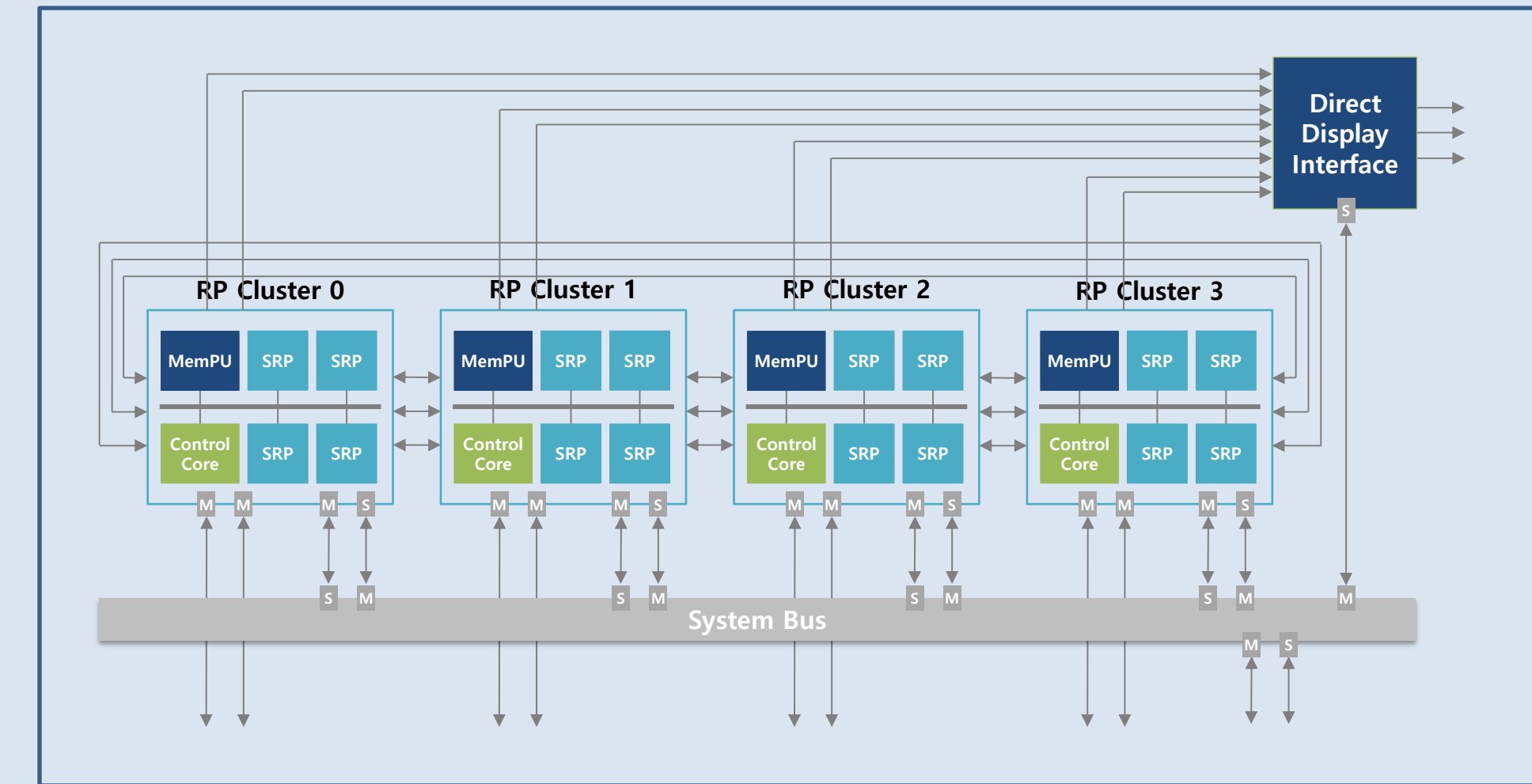
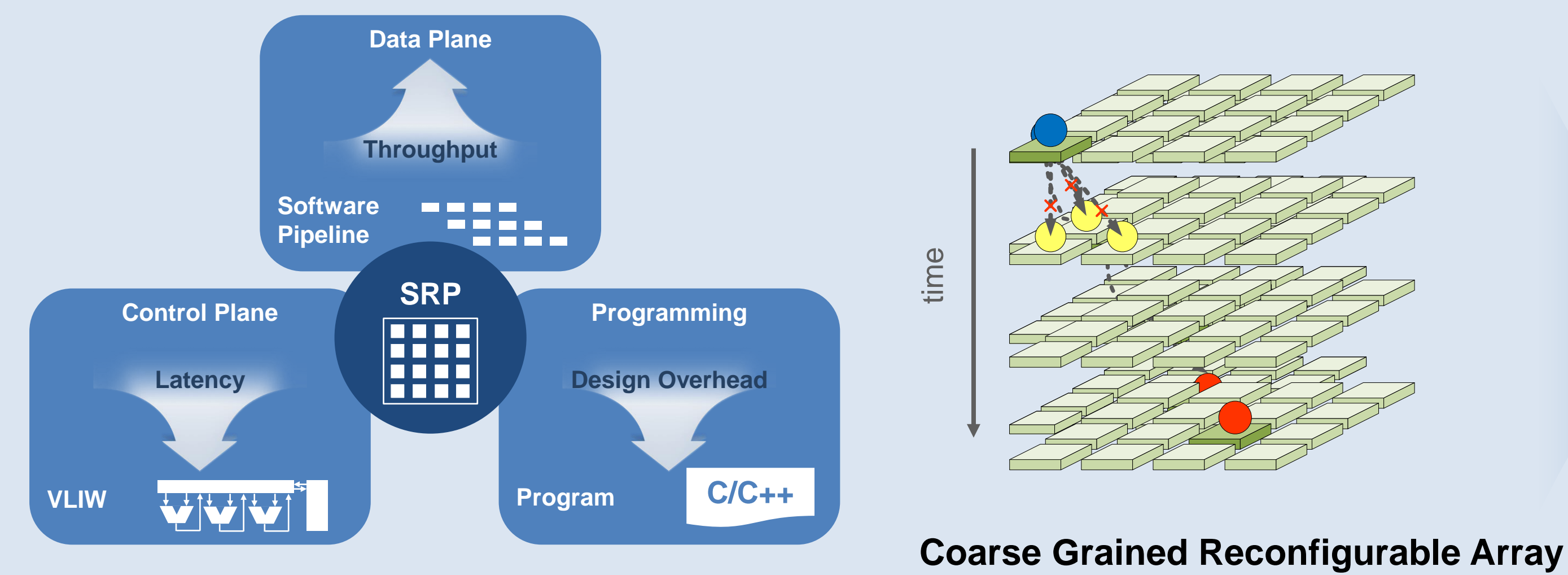


# Flexible Video Processing Platform for 8K UHD TV

SAMSUNG  
ELECTRONICS

Sukjin Kim, Young-Hwan Park, Jaehyun Kim, Minsoo Kim, Wonchang Lee and Shihwa Lee

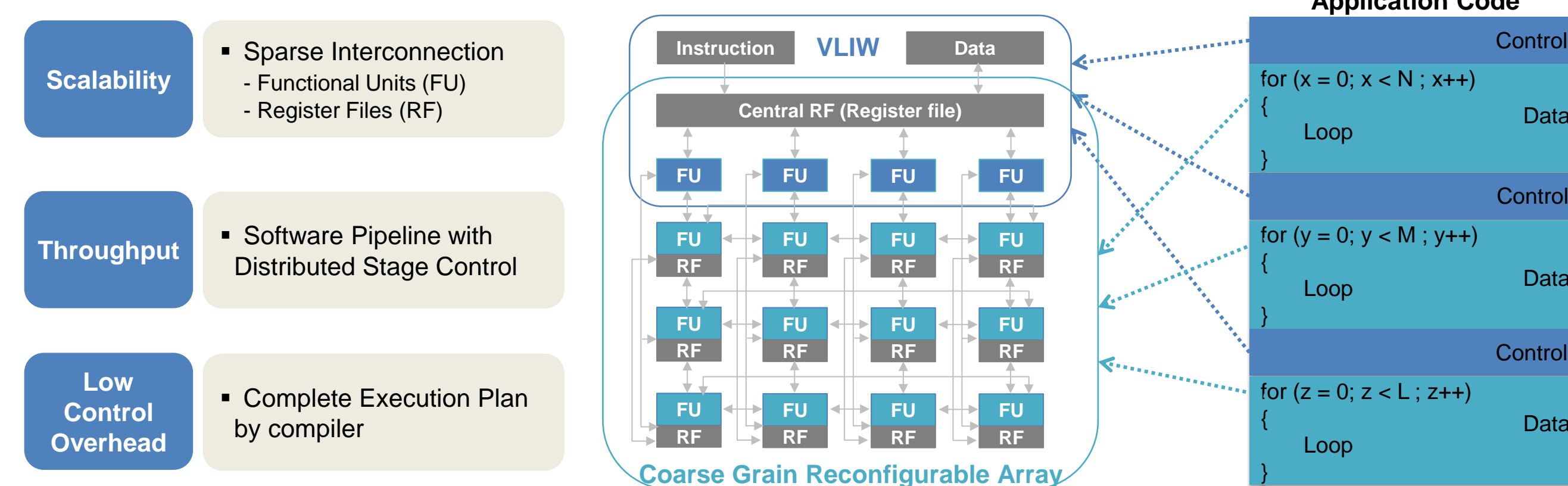


## 110" 8K UHD TV Proto

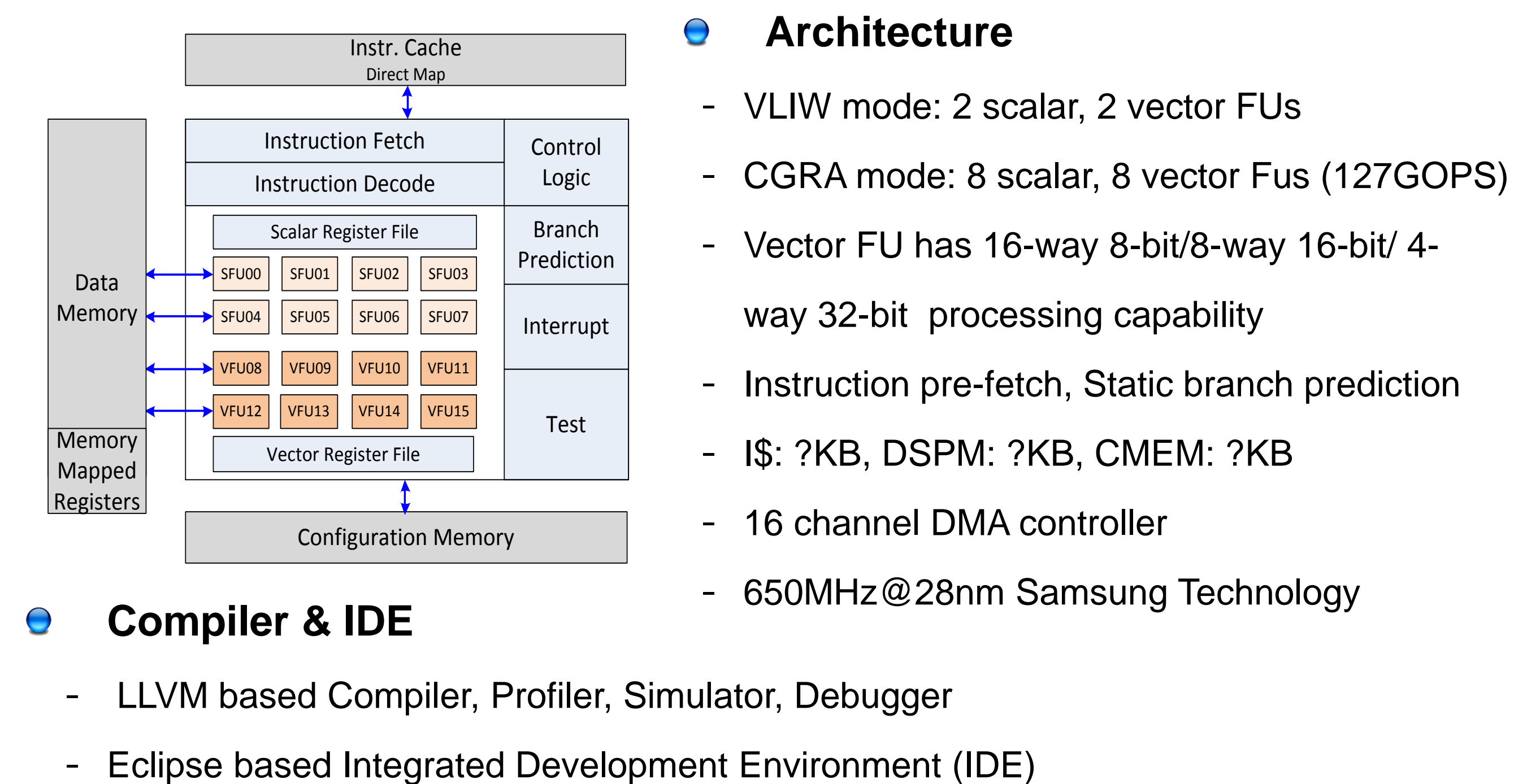
- 110 inch LCD
- Resolution: 8K (7680 x 4320)
- 60Hz Refresh Rate
- 8-bit Pixel Depth
- Brightness: 500nit

## Samsung Reconfigurable Processor

- SRP is Samsung's proprietary DSP processor since 2005
- Exploit huge speed-up for loops by applying data level parallelism



- Control code runs by VLIW & loop code by CGRA
- High throughput with a large number of Processing Element (FU, RF)
- Share register file to minimize data transfer overhead
- Power reduction by disabling unused FUs in VLIW



### Architecture

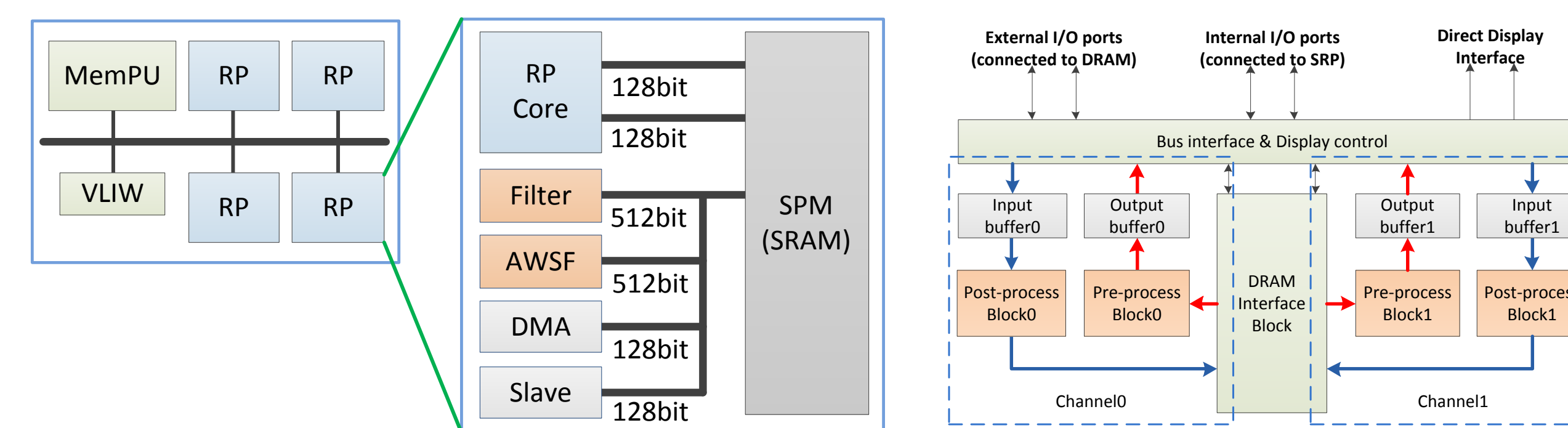
- VLIW mode: 2 scalar, 2 vector FUs
- CGRA mode: 8 scalar, 8 vector FUs (127GOPS)
- Vector FU has 16-way 8-bit/8-way 16-bit/ 4-way 32-bit processing capability
- Instruction pre-fetch, Static branch prediction
- IS: ?KB, DSPM: ?KB, CMEM: ?KB
- 16 channel DMA controller
- 650MHz@28nm Samsung Technology

### Compiler & IDE

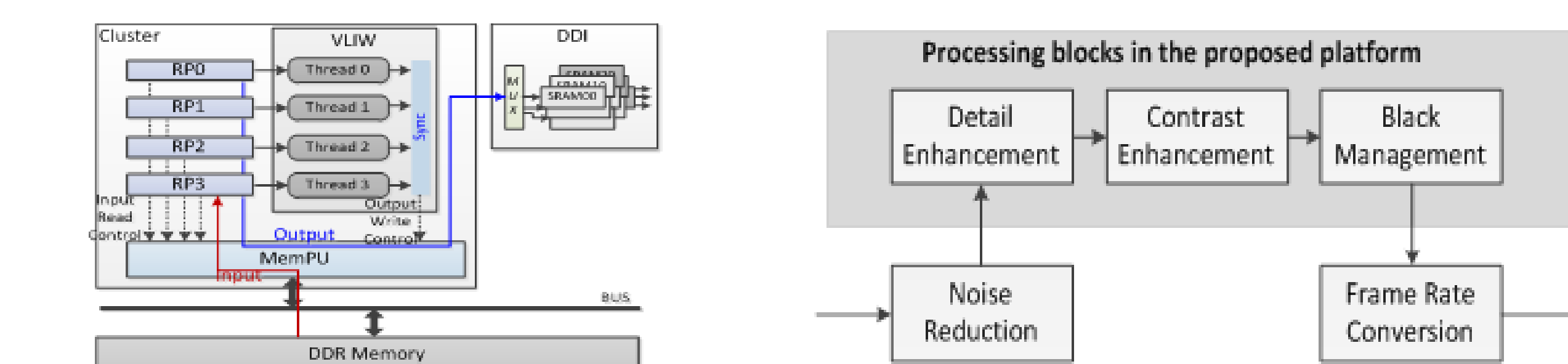
- LLVM based Compiler, Profiler, Simulator, Debugger
- Eclipse based Integrated Development Environment (IDE)

## Flexible Video Processing Platform

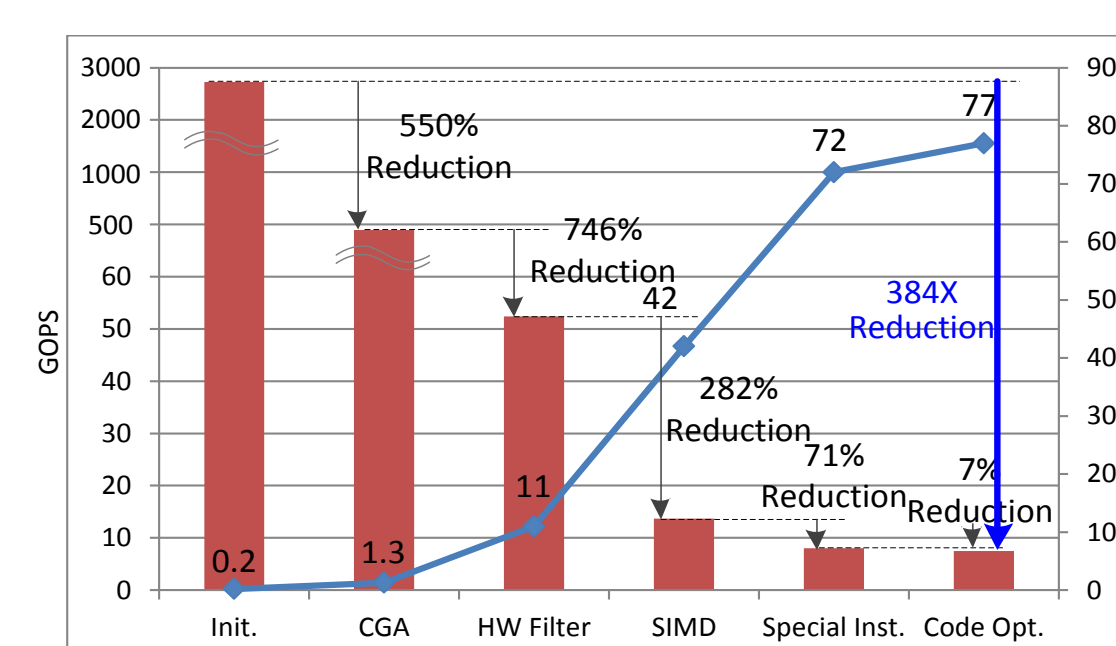
- The world's 1<sup>st</sup> flexible platform for 8K UHD video post processing
- The platform is capable of running up to 4.3 TOPS



- Symmetric multi-cluster architecture for data partitioning
- On-the-fly Direct Display Interface for reducing DDR bandwidth
- Hybrid architecture by combining SRP and hardware accelerators



Data flow of the proposed platform



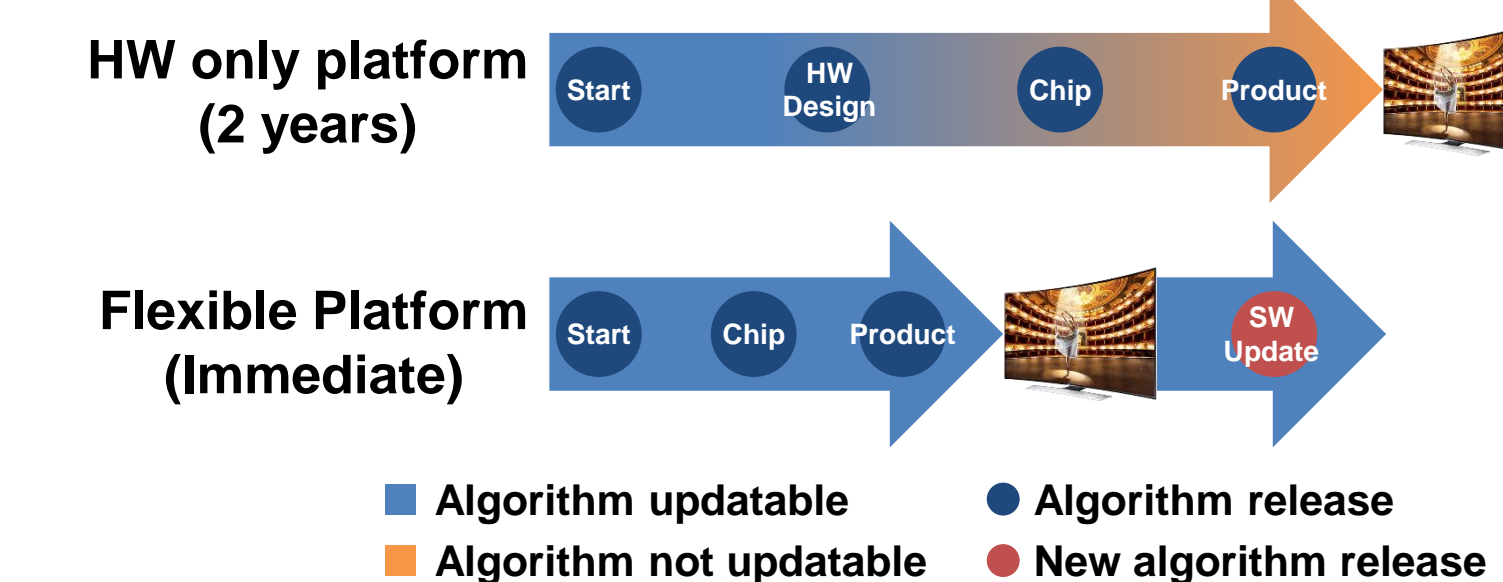
Performance improvement approaches

Module	# of units	TOPS	GC/Unit
VLIW	4	0.1	0.9M
SRP	16	1.2	1.9M
HWA	Filter: 16 AWSF: 4	3.0	1.1M
Total		4.3	54M

Computing performance and area

## 8K UHD TV

- Emerge various new tech. for display, standards and services
- Require flexible platform as disruptive innovation for Video Processing



	HW	DSP	Flexible platform (DSP+HW)
Performance	⊙	⊙	⊙
Flexibility	X	⊙	⊙

- Flexible video processing platform is able to response immediately

### - New Algorithms



### - New Standards



### - New Panels

